

In the Claims:

1. (Currently Amended) A method of forming a dielectric layer in an opening, comprising:

forming a first dielectric layer at a first deposition rate in the opening, the opening having an aspect ratio greater than about two, and wherein a portion of the opening not filled with said first dielectric layer has an aspect ratio of not greater than about two; and

forming a second dielectric layer at a second deposition rate greater than the first deposition rate over the first dielectric layer, the second layer filling the portion of the opening not filled with the first dielectric layer and having a top surface that is not within the opening such that voids are substantially not present in the opening.

2. (Original) The method of claim 1, further comprising providing a substrate before forming the opening.

3. (Original) The method of claim 2, wherein providing the substrate includes providing a substrate selected from the group consisting of a silicon substrate, an insulator substrate, and a sapphire substrate.

4. (Original) The method of claim 1, wherein forming a first dielectric layer includes forming the first dielectric layer having a top surface that is not within the opening.

5. (Original) The method of claim 1, wherein forming a first dielectric layer includes forming the first dielectric layer having a top surface that is within the opening.

6. (Original) The method of claim 1, wherein:
forming a first dielectric layer includes forming the first dielectric layer through an ozone-TEOS deposition; and
forming a second dielectric layer includes forming the second dielectric layer through an ozone-TEOS deposition.

7. (Original) The method of claim 1, wherein:
forming a first dielectric layer includes forming the first dielectric layer at a first process setting; and
forming a second dielectric layer includes forming the second dielectric layer at a second process setting at a predetermined relationship with the first process setting.

8. (Original) The method of claim 7, wherein the first process setting and the second process setting are selected from the group consisting of temperature, reactor chamber pressure, dopant concentration, flow rate, and shower head spacing.

9. (Original) The method of claim 1, wherein:

forming a first dielectric layer includes forming the first dielectric layer at a first temperature; and

forming a second dielectric layer includes forming the second layer at a second temperature, the second temperature being less than the first temperature.

10. (Original) The method of claim 1, wherein:

forming a first dielectric layer includes forming the first dielectric layer at a first pressure; and

forming a second dielectric layer includes forming the second dielectric layer at a second pressure, the second pressure being greater than the first pressure.

11. (Original) The method of claim 1, wherein:

forming a first dielectric layer includes forming the first dielectric layer at a first dopant concentration; and

forming a second dielectric layer includes forming the second layer at a second dopant concentration, the first dopant concentration being less than the second dopant concentration.

12. (Original) The method of claim 1, wherein:

forming a first dielectric layer includes forming the first dielectric layer at a first total TEOS and dopant flow rate; and

forming a second dielectric layer includes forming the second layer at a second total TEOS and dopant flow rate, the first total TEOS and dopant flow rate being less than the second total TEOS and dopant flow rate.

13. (Original) The method of claim 1, wherein:

forming a first dielectric layer includes:

providing a shower head at a first distance from the substrate, and
providing through the shower head constituents forming the first layer; and

forming the second dielectric layer includes:

providing the shower head at a second distance from the substrate, the second distance lower than the first distance, and
providing through the shower head constituents forming the second layer.

14. (Currently Amended) A method of forming a dielectric layer during the manufacture of a semiconductor device, comprising:

providing a substrate;

forming an opening relative to the substrate, the opening having an aspect ratio greater than about two;

forming a first dielectric layer at a first deposition rate in the opening wherein a portion of the opening not filled with said first dielectric layer has an aspect ratio of not greater than about two; and

forming a second dielectric layer at a second deposition rate greater than the first deposition rate over the first dielectric layer, the second layer filling the portion of the opening not filled with the first dielectric layer and having a top surface that is not within the opening such that voids are substantially not present in the opening.

15. (Original) The method of claim 14, wherein forming an opening includes forming an opening in the substrate.

16. (Original) The method of claim 14, wherein forming an opening includes forming an opening on the substrate.

17. (Original) The method of claim 14, wherein forming an opening includes forming a plurality of structures on the substrate so that said plurality of structures forms an opening.

18. (Original) The method of claim 17, wherein forming a plurality the structures includes forming a plurality of conductors.

19. (Currently Amended) A method of forming a dielectric layer in an opening, comprising:

forming a first dielectric layer at a first deposition rate in the opening, the first layer having a first process setting; and

forming a second and final dielectric layer at a second deposition rate greater than the first deposition rate over the first dielectric layer, at least one of the first and the second layer filling the opening such that voids are substantially not present in the opening, the second layer having a top surface that is not within the opening and having a second process setting at a predetermined relationship with the first process setting.

20. (Original) The method of claim 19, wherein the first process setting and the second process setting are selected from the group consisting of temperature, reactor chamber pressure, dopant concentration, flow rate, and shower head spacing.

21. (Original) The method of claim 19, wherein the first process setting includes a first temperature, and the second process setting includes a second temperature, the first temperature being greater than the second temperature.

22. (Original) The method of claim 19, wherein the first process setting includes a first pressure, and the second process setting includes a second pressure, the first pressure being greater than the second pressure.

23. (Original) The method of claim 19, wherein the first process setting includes a first dopant concentration, and the second process setting includes a second dopant concentration, the first dopant concentration being less than the second dopant concentration.

24. (Original) The method of claim 19, wherein the first process setting includes a first flow rate, and the second process setting includes a second flow rate, the first flow rate being less than the second flow rate.

25. (Original) The method of claim 19, wherein the first process setting includes:

providing a shower head at a first distance from the substrate, and
providing through the shower head constituents forming the first
layer; and

said second process setting includes:

providing the shower head at a second distance from the substrate,
the second distance lower than the first distance, and

providing through the shower head constituents forming the second
layer.

26. (Currently Amended) A method of forming a dielectric layer in an opening, comprising:

forming a first dielectric layer at a first deposition rate completely filling the opening, the opening having an aspect ratio greater than about two; and

forming a second and final dielectric layer at a second deposition rate greater than said first deposition rate over the first dielectric layer such that voids are substantially not present in the opening.

27. (Currently Amended) A method of forming a dielectric layer in an opening, comprising:

forming a first dielectric layer at a first deposition rate in the opening, the first layer being formed at a first temperature; and

forming a second and final dielectric layer at a second deposition rate greater than the first deposition rate over the first dielectric layer, at least one of the first layer and the second layer filling the opening such that voids are substantially not present in the opening, the second layer having a top surface that is not within the opening and being formed at a second temperature, the first temperature being greater than the second temperature.

28. (Currently Amended) A method of forming a dielectric layer in an opening, comprising:

forming a first dielectric layer at a first deposition rate in the opening, the first layer being formed at a first pressure; and

forming a second and final dielectric layer at a second deposition rate greater than the first deposition rate over the first dielectric layer, at least one of the first layer and the second layer filling the opening such that voids are substantially not present in the opening, the second layer having a top surface that is not within the opening and being formed at a second pressure, the first pressure being greater than the second pressure.

29. (Currently Amended) A method of forming a dielectric layer in an opening, comprising:

forming a first dielectric layer at a first deposition rate in the opening, the first layer having a first dopant concentration; and

forming a second and final dielectric layer at a second deposition rate greater than the first deposition rate over the first dielectric layer, at least one of the first layer and the second layer filling the opening such that voids are substantially not present in the opening, the second layer having a top surface that is not within the opening and having a second dopant concentration, the first dopant concentration being less than the second dopant concentration.

30. (Currently Amended) A method of forming a dielectric layer in an opening, comprising:

forming a first dielectric layer at a first deposition rate in the opening, the first layer being formed at a first flow rate; and

forming a second and final dielectric layer at a second deposition rate greater than the first deposition rate over the first dielectric layer, at least one of the first layer and the second layer filling the opening such that voids are substantially not present in the opening, the second layer having a top surface that is not within the opening and being formed at a second flow rate, the first flow rate being less than the second rate.

31. (Currently Amended) A method of forming a dielectric layer in an opening, comprising:

forming a first dielectric layer at a first deposition rate in the opening, said forming the first layer including:

providing a shower head at a first distance from the substrate, and

providing through the shower head constituents forming the first layer; and

forming a second and final dielectric layer at a second deposition rate greater than the first deposition rate over the first dielectric layer, at least one of the first layer and the second layer filling the opening such that voids are substantially not present in the opening, the second layer having a top surface that is not within the opening, said forming the second layer including:

providing the shower head at a second distance from the substrate, the second distance lower than the first distance, and

providing through the shower head constituents forming the second layer.

32-57. (Canceled)